2. REGIONAL CONTEXT

2.1 SOUTHERN CALIFORNIA COASTAL WETLANDS

The Ballona Wetlands ecosystem is one of the last remaining major coastal wetlands in Los Angeles County. There are approximately 40 coastal wetlands along the 160 km coastline of the US portion of the Southern California bight, between Point Conception and the border with Mexico (Southern California Wetlands Inventory, 1998; http://ceres.ca.gov/wetlands/geo_info/so_cal.html).

Historically, Southern California wetlands naturally occurred across a wide range of conditions, from larger systems that were almost always under tidal influence to smaller systems that were intermittently closed and non-tidal. Most of these wetlands have been modified by human activity, resulting in losses of natural wetland habitat. The modern wetlands generally exist under disturbed conditions and are often surrounded by extensive urban development (Zedler, 1982, 2001). The remaining natural coastal wetlands comprise a variety of environments including saline lagoons, embayments, river mouth marshes and saltmarshes, depending on their physiographic location along the coast (Ferren et al., 1995).

Most of the Southern California wetlands are small and isolated, being confined to narrow river valleys and separated by coastal hills and mountains. They occur within two distinct groups of tidally-influenced estuaries and coastal lagoons (Macdonald, 1988). The first includes relatively deep water lagoons and ocean inlets with tidal prisms large enough to maintain permanent tidal exchange throughout the system. The second group is made up of smaller, shallower estuaries and lagoons that can periodically close at the inlet due to longshore transport of sand forming a sand bar across their mouths, smaller tidal prisms, and lower downstream freshwater flows. Generally, the longshore transport of sediment is stronger than the stream discharges at the inlet and the entrance to the coastal wetland is closed for long periods, only to be opened again when stream discharges increase during floods in winter. The Mediterranean climate provides low levels of precipitation (occurring seasonally during wet winters) and, depending on the inflow of freshwater and salt water, the soils may vary considerably in salinity during the year (Zedler, 1982). Soil salinity, in turn, directly affects the distribution of plants within the wetland (Hendrickson, 1991a; Zedler, 1982, 2001).

Zedler (1982) reported 19 dominant species of plant within the saltmarshes of Southern California. The general composition of plant communities changes with elevation (although most species have broad ranges of distribution and a degree of overlap occurs) with cordgrass (*Spartina foliosa*) typical of the lower elevations (with open mudflat within the stands are often colonized by *Salicornia bigelovii* and *Batis maritima*) while pickleweed (*Sarcocornia pacifica* syn: *Salicornia virginica*) dominates in the low to middle elevations. Pickleweed has the broadest distribution, occurring throughout most of the elevational range of cordgrass as well as being capable of becoming established on disturbed soils. Common species in the middle to high elevations include fleshy jaumea (*Jaumea carnosa*), salt grass (*Distichlis spicata*), and alkali heath (*Frankenia salina*). Although the flora of Southern California wetlands is limited, the tolerant species form highly dynamic communities both within wetlands, and between wetlands, that respond to both natural and anthropogenic environmental changes.

The smaller marshes are more likely to be dominated by pickleweed because environmental conditions become more extreme when ocean inlets close or narrow and tidal influence is absent or decreased for extended periods. If freshwater inputs dominate the water levels and salinity regimes, brackish marsh can become dominant. Upper marsh species might remain well represented, and large numbers of opportunistic weed species are usually present.

In general, the Southern California saltmarshes with a long history of good tidal flushing tend to have more native saltmarsh plant species than marshes with inlets that are closed (PERL, 1990). Drought and hypersalinity due to limited tidal flushing or mouth closure can lead to the elimination of the less tolerant halophytes, such as cordgrass, while promoting the more tolerant species, like pickleweed (Boland and Zedler, 1991; Zedler, 1996; Callaway and Zedler, 2004).

2.2 HISTORICAL CHANGE TO SOUTHERN CALIFORNIA COASTAL WETLANDS

Many Southern California coastal wetlands have been altered or eliminated by human activities over the past 150 years. The total area of Southern California coastal wetlands is estimated to be approximately 25-30% of what it was prior to European colonization (the Southern California Wetlands Inventory, 1998, estimated historic coastal wetland extent to be between 45,000 and 55,000 acres).

The California Coastal Commission, in its Procedural Guidance for the Review of Wetland Projects in California's Coastal Zone (http://www.coastal.ca.gov/web/wetrev/wettc.html) identified a variety of human activities that have caused losses and impacts to coastal wetlands. These activities include: draining wetlands and converting to agricultural uses; deposition of fill on top of wetlands to construct urban areas, roads, railways or oil development; dredging new and expanded channels to create marinas; filling wetlands to increase the area of shoreline support facilities; and constructing flood control projects that result in the dredging, filling, and channelization of wetlands to prevent the natural dissipation of water and sediment into low-lying areas. The Ballona ecosystem has experienced all of these impacts.

Such activities lead to significant changes to the wetland processes and the geomorphological and ecological linkage between coastal watersheds, wetlands and the marine system. The main changes to these systems include draining, filling and converting wetlands, hydrological modification, alterations to sediment transport processes and degradation of water quality (Wetlands Recovery Project, 2001). Freshwater inflows to many Southern California estuaries have been substantially altered and tidal inlets have been restricted. Although dams have reduced sediment inputs, increased freshwater inflows and storm inputs have led to sediment accumulation and infilling of many estuarine systems (e.g. Greer and Stow, 2003).

In recognition of the losses of coastal wetlands and the importance of these resources for habitat, water quality and other benefits, there are a number of efforts underway to protect and restore wetlands. Major restoration projects are underway at many coastal wetlands in Southern Califbrnia, including projects at:

Ormond Beach, Malibu Lagoon, Bolsa Chica, Huntington Beach Wetlands, San Elijo Lagoon, Buena Vista Lagoon and Tijuana Estuary to name a few. Due to the changes in wetland processes and ecological linkages described above, there are many challenges and constraints to wetland restoration. In many cases, these projects involve creating a functioning wetland system, but not necessarily re-creating the historic conditions.

In the late 1990s, the Southern California Wetlands Recovery Project (WRP) was formed to develop a regional strategy for wetland recovery in the U.S. portion of the Southern California Bight (Wetlands Recovery Project, 2001). The WRP identified six regional goals to achieve its vision to re-establish functioning wetland systems that support a diverse range of fauna and flora, while providing socio-economic benefits. These are:

- Preserve and restore coastal wetland systems.
- Preserve and restore stream corridors and wetland ecosystems in coastal watersheds.
- Recover native habitat and species diversity.
- Integrate wetlands recovery with other public services.
- Promote education and compatible access related to coastal wetlands and watersheds.
- Advance the science of wetland restoration and management in Southern California.

The focus of the WRP is preservation and restoration of coastal wetland ecosystems, aquatic and riparian habitat, and re-establishment of ecosystem functions such as hydrological processes, sediment transport and water quality.

2.3 SANTA MONICA BAY

Within the Southern California Bight eco-region, it is useful to consider Ballona Wetlands more specifically in the context of the wetlands of the Santa Monica Bay watershed. Josselyn et al. (1993) undertook a wetland inventory for the Santa Monica Bay Watershed Project to characterize the current status of the wetlands within the watershed. The tidal wetlands in the Santa Monica Bay watershed are concentrated in two main locations, Ballona and Malibu. Ballona Wetlands (including Ballona and Del Rey Lagoons and Ballona Creek) is the largest coastal wetland along the Santa Monica Bay.

Wetlands were divided into three main habitat types:

- Riverine – all wetland and deep-water habitats that flow within a channel.
- Palustrine – non-tidal wetlands dominated by vegetation, further divided into those related to riparian corridors and floodplains and those associated with open water such as lakes, ponds and reservoirs.
- Estuarine – deep-water tidal habitats and associated tidal wetlands with salinities exceeding 0.5ppt. In Southern California, lagoons are the predominant type of estuary.

Table 2-1 (from Josselyn et al., 1993) shows the distribution and extent of each wetland type that he found. The total wetland acreage for the Santa Monica watershed was estimated to be approximately 3000 acres, of which about 9% were classified as estuarine coastal marsh or lagoon habitat. The majority of the area, about 60%, was riverine and palustrine wetlands associated with streams (riparian and floodplain palustrine). Open water habitat, including many anthropogenic recreational and storage lakes, made up 31% of the remaining wetland habitats

Of the estuarine wetlands in the watershed, 41% (24 acres) of the lagoon saltmarsh and 100% (225 acres) of the diked wetlands occur at Ballona (Josselyn et al., 1993). The majority of the remaining estuarine wetlands were found in Malibu.

Table 2-1. Areas (in acres) of Wetland Types in the Santa Monica Bay Watershed

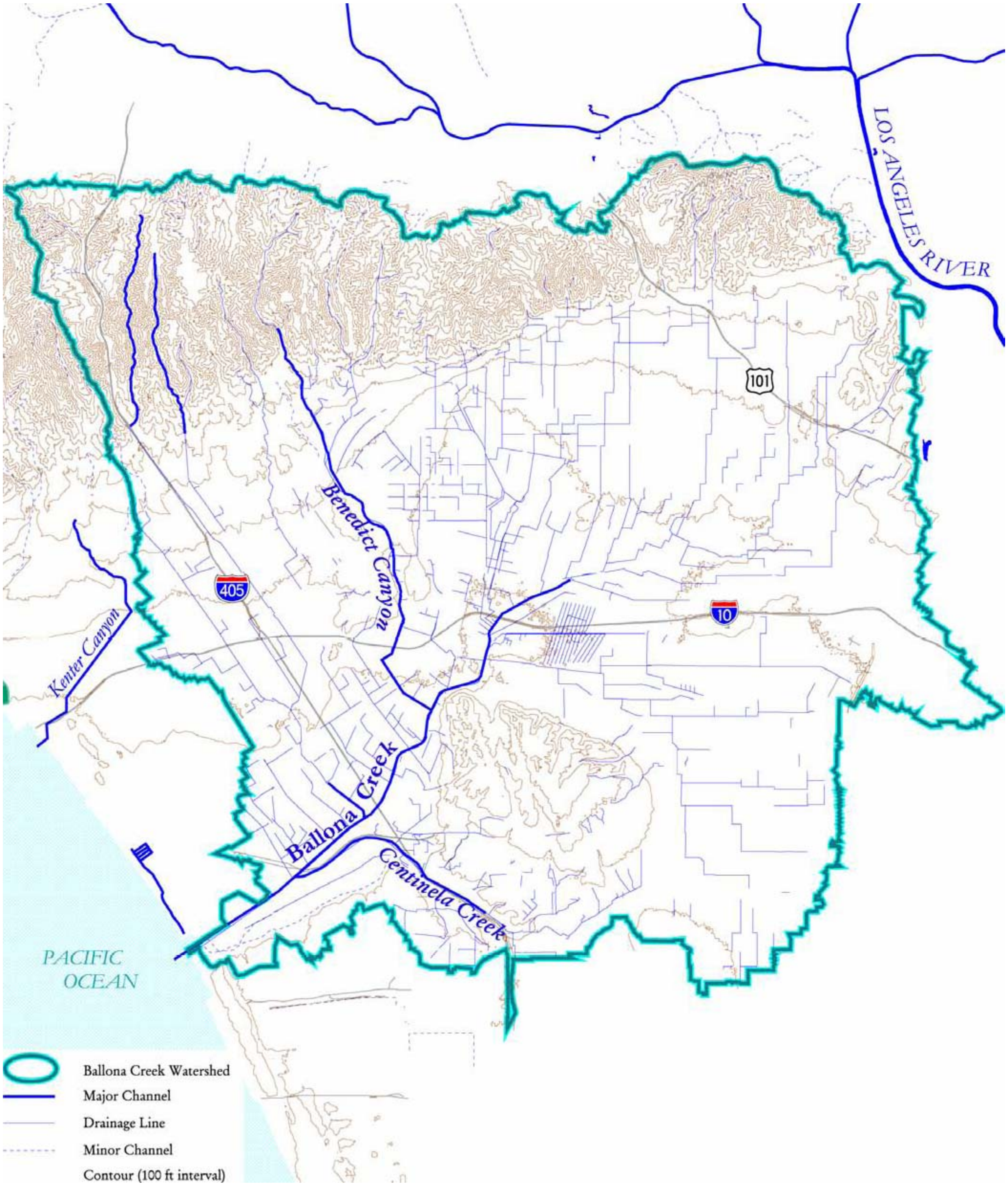
Quadrangle	Riverine	Palustrine Riparian/ floodplain	Palustrine Open water	Lagoons Saltmarsh	Diked Wetlands
Beverley Hills	31.0	10.7	228.5	0.0	0.0
Burbank	4.8		15.9	0.0	0.0
Calabasas	37.2	143.4	4.6	0.0	0.0
Canoga Park	3.2	3.9	1.0	0.0	0.0
Hollywood	3.3		103.6	0.0	0.0
Inglewood	0.5	11.0	4.7	0.0	0.0
Malibu Beach	105.9	365.8	23.3	32.7	0.0
Newbury Park	9.2	50.4	19.7	0.0	0.0
Point Dume	100.5	303.1	82.3	1.1	0.0
Redondo Beach	15.3		3.3	0.0	0.0
San Pedro	9.0	0.0	0.0	0.0	0.0
Thousand Oaks	47.8	109.1	402.7	0.0	0.0
Topanga	62.4	243.6	19.3	0.0	0.0
Torrance	3.9		26.3	0.0	0.0
Triunfo pass	39.3	78.1	5.3	0.0	0.0
Van Nuys	3.9		1.2	0.0	0.0
Venice (Ballona)	9.0	24.3	0.3	23.8	225.0
Total	486.2	1343.4	942.0	57.6	225.0
	16%	44%	31%	2%	7%

2.4 BALLONA CREEK WATERSHED

The Ballona Creek watershed covers approximately 130 square miles located in the western portion of the Los Angeles Basin (Figure 2-1). The headwaters of the watershed are located in the Santa Monica Mountains to the north and the Baldwin Hills to the south. The urbanized areas account for 80% of the watershed area, and the partially developed foothills and mountains (Hollywood Hills, Santa Monica Mountains) make up the remaining 20%.

Most of the Ballona Creek channel network has been modified into storm drains, underground culverts, and open concrete channels to provide drainage and flood management. Ballona Creek itself is an open trapezoidal channel with armored banks between Venice Boulevard and Pickford Street and its confluence with Santa Monica Bay (a length of approximately nine miles) at Playa Del Rey. Runoff from the watershed is discharged from the channel into Marina Del Rey's south entrance channel and Santa Monica Bay at the mouth of Ballona Creek. Ballona Creek is tidally influenced to just above the confluence with Centinela Creek; which includes the section of channel adjacent to restoration Areas A, B, and C.

2.5 SECTION 2 FIGURES



Source: Department of Public Works, Ballona Creek Watershed Management Plan, 2004

figure 2-1

Ballona Wetlands Restoration

Ballona Creek Watershed

PWA Ref# 1793

PWA